Winthrop University

Addition of:

Master of Arts in Teaching

Secondary Teacher Education, Chemistry

(Traditional and One-Year Options)

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Program Overview

Name of Proposed Program .....Master of Arts in Teaching, Secondary Teacher Education, Chemistry (traditional and one-year options)
Academic units involved .....College of Arts and Sciences and Richard W. Riley College of Education
Level .....Master's Degree
Proposed date of implementation.....June 2012
CIP code.....131205
Program.....Modification
Qualified for Supplemental Scholarship .....No
Delivery mode .....Traditional

Justification for the Program

Program Purpose and Goals

The purpose of the proposed program is to provide an option for certification in chemistry. The program will use the structure and faculty currently involved with traditional Master of Arts in Teaching (MAT) programs and one-year Master of Arts in Teaching (MAT1) programs. Existing 500-level chemistry content courses will be utilized in the MAT option. Graduate students with appropriate content preparation in chemistry will have a clear path to certification at the graduate level. Currently such students at Winthrop must seek biology certification and request from the state add-on chemistry or broad-field science certification. The admission requirements and selection of courses will directly address the National Science Teachers Association (NSTA) science content requirements and the South Carolina Department of Education expectations for teacher certification. The program goals match those of the Specialized Professional Association (SPA) standards for teacher certification:

- Teachers of science understand and can articulate the knowledge and practices of contemporary science. They can interrelate and interpret important concepts, ideas, and applications in their fields of licensure; and can conduct scientific investigations (NSTA, Standard 1).
- Teachers of science engage students effectively in studies of the history, philosophy, and practice of science. They enable students to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science (NSTA, Standard 2).
- Teachers of science engage students both in studies of various methods of scientific inquiry and in active learning through scientific inquiry. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to develop concepts and relationships from empirical experiences (NSTA, Standard 3).
- Teachers of science recognize that informed citizens must be prepared to make decisions and take action on contemporary science- and technology-related issues of interest to the general society. They require

students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values (NSTA, Standard 4).

- Teachers of science create a community of diverse learners who construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies (NSTA, Standard 5).
- Teachers of science plan and implement an active, coherent, and effective curriculum that is consistent with the goals and recommendations of the National Science Education Standards. They begin with the end in mind and effectively incorporate contemporary practices and resources into their planning and teaching (NSTA, Standard 6).
- Teachers of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage students in science-related studies or activities related to locally important issues (NSTA, Standard 7).
- Teachers of science construct and use effective assessment strategies to determine the backgrounds and achievements of learners and facilitate their intellectual, social, and personal development. They assess students fairly and equitably, and require that students engage in ongoing self-assessment (NSTA, Standard 8).
- Teachers of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field (NSTA, Standard 9).
- Teachers of science strive continuously to grow and change, personally and professionally, to meet the diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment (NSTA, Standard 10).

Need for the Program

Winthrop University has provided an option for teacher certification in several content areas at the graduate level for many years. The MAT programs offer options for certification to career changers and undergraduates deciding to pursue teacher certification late in a content degree program. With the addition of one-year options, the opportunity for qualified individuals to pursue teacher certification programs expands. The proposed chemistry major will offer an additional group of individuals the ability to seek certification in a much-needed content area.

Through work with school districts in the immediate Winthrop region and other high-need districts, the science and education faculty have identified a significant need for teachers with chemistry certification. Further, many of our own undergraduate students have expressed interest in finding ways to seek certification after graduation. This is evidenced by the number of such students that enter the MAT program and pursue biology certification even though this requires extensive prerequisite work in biology. Providing an option for chemistry certification will facilitate the recruitment of individuals with science degrees for the teaching field.

Centrality of the Program to the Institutional Mission

The mission of the program is congruent with that of the University, the Richard W. Riley (RWR) College of Education, and the College of Arts and Sciences. The University mission statement includes the following: "The University provides personalized and challenging undergraduate, graduate, and continuing professional education programs of national caliber within a context

dedicated to public service to the state of South Carolina." The College of Education mission statement asserts the following: "The Richard W. Riley College of Education is dedicated to the highest ideals of teaching, scholarship, and service. The College meets this mission through the preparation of professionals who are committed to the betterment of society through a lifelong quest for excellence in leadership, learning, stewardship, and the communication of ideas." Finally, the mission of the College of Arts and Sciences states: "The College of Arts and Sciences provides educational opportunities for students to gain knowledge, insights, and skills in order to grow more sensitive to the significance of the human heritage, to participate and contribute knowledgeably and effectively as citizens, and to lead rewarding, productive and enriched lives within the contemporary world." The addition of MAT and MAT1 chemistry programs fit into the context of these missions because, like the mission of the University and the colleges, the mission of this program is to provide high quality academic preparation for science teachers. Their professional training will provide school districts and secondary students with access to certified individuals uniquely qualified to teach in chemistry classrooms across the state.

Conceptual Framework Summary

The focal point of the conceptual framework, *Teacher as Educational Leader*, in the RWR College of Education, is to prepare educational leaders who are committed to the betterment of society through a lifelong quest for excellence in leadership, learning, stewardship, and the communication of ideas. University faculty, administrators, PK-12 school representatives, and teacher candidates developed the conceptual framework collaboratively. The conceptual framework for the initial graduate certification program consists of six related concepts. The six concepts are 1) Instruction, 2) Subject Area Content, 3) Learners, 4) Society, 5) Curriculum, and 6) Scholarship.

The *Teacher as Educational Leader* document provides guidance for a program committed to self-discovery and pedagogical study. This commitment requires the candidate to search for a deeper understanding of self and others while examining the moral, social, and political implications of teaching and learning in a democracy.

Content and Pedagogy. The knowledge of an educational leader rests on a firm foundation in the liberal arts, in the specific content to be taught, and pedagogy. At Winthrop, teacher candidates make connections between pedagogy and the disciplines and examine methodologies appropriate to their fields. Knowledge in such areas as human growth and development, historical and philosophical foundations, professional responsibilities, diversity, literacy, and school law are woven into the program through a well-articulated core of courses. Knowledge of technology and opportunities to use it to promote learning are developed throughout the program. Current educational research; specialized professional association standards; feedback from practitioners, including university faculty working in the schools, graduates, and current candidates; and demographic trends influence continuous modifications and improvements in the program.

Curiosity, critical thinking, inquiry, independent learning, and reflection on one's learning are promoted in the program. Faculty model those behaviors and dispositions that are expected of candidates and provide opportunities for them to develop and practice such behaviors as part of their educational program. Faculty engage in practices such as team teaching, planning, collaborative research, professional development, and peer observation that inform their teaching and scholarship.

Clinical Practice. A field experience, followed by a full-semester internship, integrates the candidate's content knowledge and pedagogical learning. Candidates are placed in schools with teachers and administrators who are knowledgeable about the scope and sequence of the conceptual framework for graduate teacher education.

Evaluation. Evaluation of candidates includes clear admission standards followed by documented performance-based assessments. Performance in courses, field experiences, the internship, and reflective portfolios serve as measures of the educator's competence in the required learning areas. At the conclusion of the program, teacher candidates engage in a capstone course which provides a final opportunity for reflection and synthesis and allows candidates to complete their portfolios before initial teacher certification. Performance assessment during the professional semester through the capstone course ensures the candidate's attainment of competencies.

Relationship of the Program to Other Programs within the Institution

The addition of MAT chemistry and MAT1 chemistry programs for certification will utilize existing course work and faculty. Teacher candidates seeking certification in chemistry will be enrolled as graduate students and be engaged with other MAT and MAT1 candidates in core education courses. For science methods, these students will join students in the existing biology certification option (SCIE591: Principles of Teaching Science). Finally, existing 500-level content courses offered through the Department of Chemistry, Physics, and Geology will be used.

The existing science methods course is already designed to discuss general methods for teaching science. All Winthrop science education majors take a well-rounded set of science courses as required by the National Science Teachers Association (NSTA). Further, the program found that, because our science option requires courses in a variety of science fields, graduates are able to add-on Broad-Field Science Certification, if they choose to pursue this option. Therefore, having a methods course that discusses methods across scientific disciplines is the best option for our majors now and with the proposed chemistry options.

Supervision and management of Field Experience and Internship experiences for teacher candidates in the chemistry options will become part of the responsibility of the existing faculty in science education. The science educator will place chemistry candidates in appropriate chemistry classrooms. Further, this educator is certified in such a way that allows for supervision of multiple scientific disciplines.

Similarities or Differences between the Proposed Program and Other Institutions

A review of 13 institutions (both in state and out of state) with options for chemistry indicates that:

a. six offer undergraduate certification only;
b. three offer graduate programs only (most in broad-field science); and
c. four offer both undergraduate and graduate programs.

Although the University of South Carolina-Columbia lists chemistry certification as a graduate option, no program information is provided. The other graduate programs explored in the state offered broad-field programs and were not targeting chemistry majors specifically. Finally, the content admission requirements for the proposed program are consistent with breadth of undergraduate content requirements in chemistry at institutions offering undergraduate certification.

University	Certification Options related to Chemistry
College of Charleston	Undergraduate -- student has double major in chemistry and education
USC-Aiken	Undergraduate -- Secondary Chemistry Education
USC-Upstate	Undergraduate -- B.S. in Secondary Education-Chemistry
USC-Columbia	MAT lists Chemistry as an option MT may have option for Chemistry
Clemson	Fifth-year MAT similar to proposed program, but targeting career changers -- not targeting new graduates

Enrollment

Admissions Criteria

Admission to graduate study at Winthrop University is open to applicants (a) who have earned a baccalaureate degree from a regionally accredited institution with an adequate cumulative grade point average and (b) who have achieved an adequate score on an appropriate standardized examination. Winthrop University admits all qualified applicants and offers equal educational opportunities regardless of race, color, sex, age, national origin, religion or disability. Applicants are admitted on the basis of the probability of their success in completing the requirements for graduation.

In addition to the general requirements for graduate admissions, MAT students must meet the following general admissions requirements.

- An Admission Index Score of eight. (The Admission Index Score is derived by a formula-based computation of the graduate candidate's undergraduate grade-point average

(GPA) and a score on the General Test of the Graduate Record Examination (verbal and quantitative sections);
- Submit an official GRE score of at least 400 on both the verbal and quantitative sections of the exam; and
- Satisfactory completion of a writing sample as prescribed by the MAT program director.

MAT1 students must have an undergraduate GPA of 2.75 and must receive a passing score on content licensure tests.

Content requirements for the MAT and MAT1 vary by option. MAT students can meet some of the content requirements as part of the MAT program (12 graduate content hours are required of MAT students) and must pass the PRAXIS II Content examination (Chemistry, Physics and General Science—Test 0070) before internship. MAT1 students must (a) meet all content requirements at the time of admission; (b) pass the required PRAXIS II Content examination (Chemistry, Physics and General Science—Test 0070); and (c) hold a degree in Chemistry, Biochemistry, or an equivalent program conferred within the last two years.

Content expectations for both programs include:

a) 30 hours in Chemistry to include exposure to all of the following: analytical chemistry, organic chemistry, physics, biochemistry, and inorganic chemistry;
b) A lecture and lab experience in four of the five main areas of chemistry listed in (a);
c) Three to four hours in biology (must include topics in molecular biology, bioenergetics, and ecology);
d) Three to four hours in physics (must include topics in at least six of the following areas: energy, stellar evolution, properties and functions of waves, properties and functions of motions, properties and functions of forces, electricity, and magnetism);
e) Three to four hours in geology/earth science (must include topics in geochemistry, cycles of matter, and energetics of earth systems); and
f) Six to eight hours in mathematics (must include coursework in calculus and statistics*).

*the statistics requirement can be met through a scientific/research experience housed within the program

Projected Enrollment

Entire MAT and MAT5 population—all concentrations

YEAR	FALL		SPRING		SUMMER	
	Headcount	Credit hrs	Headcount	Credit hrs	Headcount	Credit hrs
2010-2011					45	360
2011-2012	45	540	45	540	48	396
2012-2013	48	576	48	522	50	420
2013-2014	50	600	50	540	55	480
2014-2015	55	660	55	585	55	480

Chemistry MAT only

YEAR	FALL		SPRING		SUMMER	
	Headcount	Credit hrs	Headcount	Credit hrs	Headcount	Credit hrs
2010-2011					1	6

2011-2012	1	12	1	12	1	6
2012-2013	2	24	2	24	2	12
2013-2014	2	24	2	24	2	12
2014-2015	2	24	2	24	2	12

Chemistry MAT1 only

YEAR	FALL		SPRING		SUMMER	
	Headcount	Credit hrs	Headcount	Credit hrs	Headcount	Credit hrs
2010-2011					1	12
2011-2012	1	12	1	9	2	24
2012-2013	2	24	2	18	2	24
2013-2014	2	24	2	18	3	36
2014-2015	3	36	3	36	3	36

Estimate of New Enrollment

Combined MAT and MAT1 New enrollment (Compared with 2009-2010 MAT enrolments)

YEAR	FALL		SPRING		SUMMER	
	Headcount	Credit hrs	Headcount	Credit hrs	Headcount	Credit hrs
2010-2011					5	60
2011-2012	5	60	5	45	8	96
2012-2013	8	96	8	72	10	120
2013-2014	10	120	10	90	15	180
2014-2015	15	180	15	135	15	180

Discussion

Although the numbers of students in the two proposed programs remains small the program is important and sustainable. First, the need for certified chemistry teachers in high schools is significant and this program will provide options for interested students. Second, no new courses or faculty will be involved in the implementation of the program. Instead students will be enrolled in education courses with other MAT and MAT1 students, in existing 500-level chemistry courses, and in the existing science methods and field based courses. The tables above provide both chemistry MAT and MAT1 numbers as well as those in other MAT options.

MAT program students typically take nine graduate credits each semester with some summer coursework. MAT1 cohorts will take 12 credits in the summer and fall then 9 credits in the spring to complete the program.

Curriculum

Sample Course of Study

MAT Program Required Core		Semester Hours
EDUC 600	Teaching in a Democracy	3
EDUC 601	Psychology Applied to Teaching	3

EDUC 602	Technology for the 21st Century Classroom	2
EDUC 605	Educational Assessment	3
EDUC 660	Effective Teaching and Management Strategies	3
READ 645	Teaching Content Area Literacy	3
EDUC 610	Effective Teaching Practices for Exceptional and Diverse Learners	3
EDUC 690	School Internship	8
EDUC 695	Capstone	1
MAT Program Required Content		**Semester Hours**
500-600 level Content Courses in CHEM and/or other sciences*		12
SCIE 591 Content-specific Teaching Methods		3
SCIE 592 Field Experience		1
Total Semester Hours		45

*Courses in this area are selected by content program faculty to ensure that content experience meets or exceeds the content expected for certification (see information to follow).

MAT1 Required Program Core	**Semester Hours**
Summer (12 hours)	
READ 645 Teaching Content Area Literacy	3
EDUC 601 Psychology Applied to Teaching	3
EDUC 600 Teaching in a Democracy	3
EDUC 660 Effective Teaching and Management Strategies	3
Fall (12 hours)	
EDUC 605 Educational Assessment	3
EDUC 602 Technology for the 21st Century Classroom	2
EDUC 610 Effective Teaching Practices for Exceptional and Diverse Learners	3
SCIE 591 Content-specific Teaching Methods	3
SCIE 592 Field Experience	1
Spring (9 hours)	
EDUC 690 School Internship	8
EDUC 695 Capstone	1

Content Expectations.
Students in the MAT program will complete the content expectations described on page 7 and pass the PRAXIS II Content examination (Chemistry, Physics and General Science—Test 0070) before entering the internship.

MAT1 students will complete the content expectations described on page 7 and pass the PRAXIS II Content examination (Chemistry, Physics and General Science—Test 0070) before admission to the program.

Assessments of student learning outcomes

Data are collected and examined as part of the Specialized Professional Association report submitted to NSTA for accreditation. These data are collected and monitored across academic years and informs decisions concerning program change.

Assessment 1: Licensure Test. For certification as a secondary chemistry teacher, South Carolina requires teacher candidates pass the Praxis II: Chemistry, Physics and General Science (0070) with a score of 540 or higher. MAT1 candidates must pass PRAXIS II: Chemistry, Physics and General Science (0070) before formal admission into the program.

Assessment 2: Assessment of general content knowledge in the discipline to be taught. The GPA from all required science and math courses or their equivalent is figured (NSTA Standard 1a). These data are used to track candidate preparation previous to and throughout the program.

Assessment 3: Planning, instruction, and assessment. The Unit Work Sample is a sequence of lesson plans and accompanying assessments completed by all teacher candidates as the culminating project for the Principles of Teaching Science (SCIE 591) course that is taken as a co-requisite with Field Experience in Teaching Science (SCIE 592) in which candidates are placed in a public school eight hours a week (full day or two half days). This Unit is a sequence of at least five related lessons that align with specific national and state content standards (NSTA 6a-b). Teacher candidates develop Unit Goals and a Rationale that show understanding of the role of each of the following NSTA Teacher Education Standards in their Unit: appropriate biological concepts, principles and theories (1a), NSES Unifying Concepts (1b), important personal and technical applications (1c), the nature of science (2a-c), inquiry methods (3a-b), socially important issues (4a-b,) and science in the community (7a-b). Aside from incorporating the above standards, lesson plans also include applicable safety precautions (9a-d) and accommodations for diverse learners. Additionally, the Unit includes an assessment plan that describes the multiple formative and summative assessments that will be utilized, ways assessment data will be used to guide and modify instruction, and plans to use assessment to engage the learners in self-reflection (8a-c).

Assessment 4: Student Teaching Assessment. The evaluations of field placements include assessment tools used during Field Experience (SCIE 592) and Internship (EDUC 690). The Field Experience is a part-time teaching assignment where teacher candidates are assigned to a mentor teacher for eight hours a week (one full day/week or two half days/week). The Internship is a full time teaching assignment where candidates are assigned to a mentor teacher for the entire semester. In both cases, there is a university supervisor that meets with and assists the candidate and mentor teacher as needed, conducts formal observations of the candidate performing instruction, and completes all evaluations. In addition, a school-based ADEPT trained evaluator conducts formal observations in all placements to provide additional assessment of the candidate's performance. Most importantly, this assessment (both evaluation tools) aligns with NSTA Standard 9-Safety and Welfare. Teacher candidates are evaluated during both the Field Experience and the Internship on this standard and its indicators. In addition, the science program specific portion of the evaluation instruments explicitly measures teacher candidates on their performance in the areas of nature of science (NSTA Standard 2), teaching by inquiry methods (NSTA Standard 3), socially important issues (NSTA Standard 4), science in the local community (NSTA Standard 7), and professionalism (NSTA Standard 10). Finally, the portions of the instruments that are common to all programs effectively measure NSTA Standard 5-General Skills of Teaching, NSTA Standard 6-Curriculum, NSTA Standard 8-Assessment, and NSTA Standard 10-Professionalism.

Assessment 5: Effects on Student Learning. MATs will complete sub-assessment #5a during SCIE 591/592 (Principles of Teaching Science and Field Experience) and sub-assessment #5b during EDUC 690 (Internship). The main goals of this assignment are for teacher candidates to measure the student learning that occurs during a lesson they teach at their eight hour/week Field Experiences (SCIE 592) and during a complete unit they have designed and implemented while completing the Internship (EDUC 690). Teacher candidates are asked to design objectives/goals that relate to appropriate content (NSTA Standard 1a), incorporate the nature of science (NSTA 2c), utilize inquiry methods (NSTA Standard 3b), and include relevant social issues (NSTA 4b). After the candidate has engaged students in instruction targeting the identified goals and objectives, post-assessments indicate level of student growth and candidate effect on student learning.

Assessment 6: Legal/Safety/Ethical Issues. This assessment consists of a safety exam (written and practical) and a safety plan. It is designed to assess the teacher candidate's knowledge of the legal and ethical responsibilities of science teachers pertaining to laboratory safety and the proper treatment of animals (NSTA Standards #9 a,b,c,d). All candidates are required to successfully complete this assessment module. MAT and MAT1 candidates will complete this assessment during the Principles of Teaching Science course (SCIE 591).

These standards will also be assessed during both the clinical experiences (Field Experience and Internship) on the Evaluation forms (assessment #4) and during lesson planning (assessment #3). Specifically, candidates will:

a. Score an 80% or better on an each section (NSTA 9a, 9b,9c and 9d) of an exam which includes traditional paper and pencil questions, but also a safety inspection; this exam will cover legal and ethical responsibilities, general principles of safety, emergencies, handling of materials, and treatment and collection of living organisms
b. Develop a Safety Plan that demonstrates both knowledge and plans for maintaining a safe classroom, including a lesson plan to introduce Safety to students (NSTA 9a, 9b, 9c and 9d); these items must be completed at the Acceptable level or higher.

Assessment 7: Research & Investigation. Winthrop chemistry majors and MAT candidates will complete this assessment during CHEM551/552. Teacher candidates will design, implement, and mathematically analyze the results of his/her original independent research project; therefore, this assessment is specifically aligned to NSTA standards 1d and 1e. For students from institutions other than WU, evidence of a research experience will be required or candidates will take CHEM551/552.

Assessment 8: Contextual Content. This assessment is a portfolio of six assignments that are completed throughout the semester**.** It is completed by MAT/MAT1 teacher candidates during the SCIE 591 (Principles of Teaching Science) course. In each assignment, teacher candidates are asked to show an understanding of the specific context of science in general, and then align it to content taught with specific examples they can utilize in the future.

a. In assignment #1, teacher candidates show understanding of the nature of science by researching two historical figures in their content area, writing about their lives and contributions of the figures, and then explaining how the work of each illustrates multiple aspects of the nature of science (NSTA Standard 2a-b).
b. In assignment #2, teacher candidates exhibit understanding of inquiry by completing a resource packet which includes resources used to develop an essay about teaching science via multiple inquiry methods, an inquiry method essay, and five instructional inquiry materials aligned to the content with a summary of each material and the level of inquiry each represents (NSTA Standard 3a.)
c. In assignment #3, teacher candidates show understanding of the Unifying Concepts by summarizing each of the National Science Education Standards Unifying Concepts, aligning at least one SC Science Standard to each of the Unifying concepts, and designing one lesson plan that aligns to at least one Unifying Concept (NSTA Standard 1b).
d. In assignment #4, teacher candidates show an understanding of the practical and technical applications of their content area by choosing two applications related to the SC Science Standards, researching these applications, and then completing an essay that includes a rationale of how these align to the SC Standards, descriptions of the applications, and possible ways to incorporate these into the classroom (NSTA Standard 1c).
e. In assignment #5, teacher candidates exhibit understanding of socially important issues and processes to analyze those issues by listing five important social issues aligned to science content standards, choosing one for research into both sides of the issue, and leading the class in an analysis of this issue (NSTA 4a).
f. In assignment #6, teacher candidates show understanding of science in the community and local resources by researching background information related to at least five local resources connected to the SC Science Standards, and then creating a lesson plan that incorporates one local resource (NSTA 7a).

New courses

The courses used in the MAT and MAT1 programs are existing courses in the College of Education and College of Arts and Sciences; therefore, no additional courses will be required. Further, students pursuing chemistry will be included in the existing science methods and field experience course. This again will not require the introduction of new courses. Sites for field experiences in 9-12 classrooms will be added to the existing list of science placements. These classrooms will be selected in accordance with the established policies of the Office of Student Academic Services in the RWR College of Education and with input from the science educator housed in the Department of Biology. Finally, supervision of chemistry field placements can be assumed initially by the current science educator.

Faculty

Rank and Academic Qualifications of Faculty

Staff	Relevant Academic Degrees	Experience/Role
Assistant Professor #1	MLIS Library and Information Science Ph.D. Educational Psychology and Research	Experience as PK-12 media specialist & coordinator (three years)
Assistant Professor #2	Ed.D. Special Education -- Reading concentration	Certification in Emotional Disturbance/ Learning Disabilities; Endorsement in ESOL & Experience as Reading Resource Teacher (six years)
Assistant Professor #3	Ph.D. Social Foundations of Education B.A., MA. Philosophy	
Assistant Professor #4	Ph.D. Curriculum & Instruction M.Ed. and B.S. in Secondary Ed - Social Studies	Secondary Education Certification in U.S. History, World History, Political Science (eight years and one year as an Assistant Principal)
Assistant Professor #5	Ph.D. Philosophy, major: Microbiology and Cell Science	Chemistry content faculty
Associate Professor #1	Ed.D. and M.Ed. Instructional Design and Development	
Associate Professor #2	Ph.D. Educational Psychology and Research, B.S. Psychology	Special Education Certification (four years)
Associate Professor #3	Ph.D., M.Ed. Special Education Learning Disabilities	Special Education Certification (two + years)
Associate Professor #4	Ph.D. Biochemistry	Chemistry content faculty
Associate Professor #5	Ph.D. Chemistry	Chemistry content faculty
Associate Professor #6	Ph.D. Organometallic Chemistry	Chemistry content faculty
Instructor #1	MS Biology	General Science Certification with teaching experience
Professor #1	M.Ed. and Ed.D. Special Education B.A. English (with certification)	Certification in English, Special Education Special Education teacher 25 years
Professor #2	Ph.D. Educational Psychology and Research Ph.D. Social Psychology M.S. School Psychology	Experience as School Psychologist (eight years)

Staff	Relevant Academic Degrees	Experience/Role
Professor #3	Ph.D. Analytical Chemistry	Chemistry content faculty

New Faculty

There is no immediate need for additional faculty. If the number of students in supervised field experiences grows significantly, additional supervision assistance would be necessary. This could be addressed initially through the use of adjunct clinical faculty with science teaching experience. Any faculty changes in the College of Education are included in the proposal for MAT1 program previously approved.

Changes in Assignments of Existing Faculty

It is expected that the current science educator housed in the Department of Biology will have increased responsibilities for helping chemistry majors with advising and additional supervision responsibilities at the graduate level. This may lead to this faculty member's role becoming more exclusively devoted to the methods and supervision of science certification majors. Any faculty changes in the College of Education are included in the proposal for MAT1 program previously approved.

Institutional Plan for Faculty Development

The primary areas of development for Winthrop faculty will be in the area of methods and advising. Although the methods course, as it currently exists is interdisciplinary, the science educator will explore current research in chemistry education in order to balance examples and readings to include appropriate experiences for chemistry candidates. Further development for advisors in the chemistry program will be provided to assist in the course selection for undergraduate students planning to pursue certification through the graduate programs. A degree plan will be created for undergraduate chemistry majors planning to pursue the MAT1 option; this plan will help guide students as they meet the required content expectations before graduation.

Development for field experiences will also be necessary. Chemistry teachers identified to host field placements will be expected to complete ADEPT training and mentor teacher training as is required of all mentors. Further, scoring guides and evaluation instruments for field placements will be reviewed for applicability to chemistry settings and adjustment will be made as needed.

Definition of FTE

One faculty FTE is defined as a single faculty member teaching more than six hours in the program in a given semester. Otherwise, one faculty FTE is defined as the accumulation of 24 semester hours of teaching in an academic year.

Headcount and FTE

These numbers take into account the entire MAT and MAT5 populations (including options beyond chemistry), science methods, field-based supervision, and 500-level content for chemistry students.

YEAR	New		Existing		Total	
	Headcount	FTE	Headcount	FTE	Headcount	FTE
2010-2011			12	4.125	12	4.125
2011-2012			12	4.125	12	4.125
2012-2013			12	4.125	12	4.125
2013-2014			12	4.125	12	4.125
2014-2015			12	4.125	12	4.125

Physical Plant

The programs will be housed in existing buildings at Winthrop University. No additional needs are expected.

Equipment

The programs will use existing equipment at Winthrop University. No additional needs are expected in relation to this program.

Library Resources

As in all fields, additional resources are needed to provide current science related materials in our library. However, this is addressed in current budgets as departments are able to request materials annually. The Departments of Biology and Chemistry, Physics, & Geology will be asked to include teacher-related materials in their departmental requests to provide additional resources for prospective teachers.

Accreditation, Approval, Licensure, or Certification

The MAT chemistry with traditional and one-year options will be included in the reports submitted to the National Science Teacher Association (NSTA) as part of the periodic National Council for Accreditation of Teacher Education (NCATE) process. Under the current accreditation process, the science education program will submit reports to the NSTA that delineate data by program and level. These reports then become part of the unit review for NCATE.

Winthrop received National Recognition with no conditions in February 2011 for the current MAT with a major in biology. For a more complete description of the program assessments, see the curriculum section of this document.

Winthrop is accredited by the Southern Association of Colleges and Schools. The university is currently undergoing the reaffirmation process.

Winthrop University's Chemistry Undergraduate Program is approved by the American Chemical Society (ACS) Committee on Professional Training (CPT). The review by ACS found that the Winthrop meets the comprehensive set of published ACS national guidelines on undergraduate chemistry professional education that have been established by the nation's largest professional organization of scientists. ACS-approved programs represent the gold standard for undergraduate science education. Students who successfully complete all of the required courses and approved electives in the chemistry program obtain an ACS-certified baccalaureate degree.

Link to national SPA standards

NSTA requires that 90% of the competencies in each of the following charts are met. The courses listed are undergraduate courses at Winthrop included in the B.S. in Chemistry program and are common to many chemistry degree programs. Some 500-level courses are included and may be used by MAT students to fulfill content requirements. A full list of course information is provided after the tables. It is important to note that the competencies including only undergraduate coursework are typical of undergraduate chemistry programs.

NSTA Science Content Requirement Analysis for Chemistry Certification

Core Competencies	Course number
Fundamental structures of atoms and molecules	CHEM105/106/108/301/302/304
Basic principles of ionic, covalent and metallic bonding	CHEM105/106/108
Physical and chemical properties and classification of elements including periodicity	CHEM105/106/108
Chemical kinetics and thermodynamics	CHEM105/106/108/301/302/304
Principles of electrochemistry	CHEM105/106/108
Mole concept, stoichiometry, and laws of composition	CHEM105/106/108/301/302/304
Transition elements and coordination compounds	CHEM105/106/108
Acids and bases, oxidation-reduction chemistry, and solutions	CHEM105/106/108
Fundamental biochemistry	CHEM105/106/108
Functional and polyfunctional group chemistry	CHEM301/302/304
Environmental and atmospheric chemistry	CHEM105/106/108, CHEM301/302/304
Fundamental processes of investigating in chemistry	CHEM108/304
Applications of chemistry in personal and community health	CHEM105/106/108, CHEM301/302/304, CHEM305
Advanced Competencies	**Course number**
Molecular orbital theory, aromaticity, metallic and ionic structures, and correlation to properties of matter	CHEM301/302/304, CHEM407-409, CHEM530/531
Superconductors and principles of metallurgy	CHEM530/531
Advanced concepts of chemical kinetics, and thermodynamics	CHEM407-409, CHEM523/525,

Advanced Competencies	Course number
	CHEM530/531
Lewis adducts and coordination compounds	CHEM407-409, CHEM523/525, CHEM530/531
Solutions, colloids, and colligative properties	CHEM407-409, CHEM523/525
Major biological compounds and natural products	CHEM302/304, CHEM523/525
Solvent system concepts including non-aqueous solvents	CHEM302/304, CHEM313/314, CHEM407-409, CHEM530/531
Chemical reactivity and molecular structure including electronic and steric effects	CHEM302/304, CHEM407-409, CHEM530/531
Organic synthesis and organic reaction mechanisms	CHEM301/302/304
Energy flow through chemical systems	CHEM301/302/304, CHEM407-409, CHEM530/531
Issues related to chemistry including ground water pollution, disposal of plastics, and development of alternative fuels	CHEM301/302/304, CHEM313/314
Historical developments and perspectives in chemistry, including contributions of significant figures and underrepresented groups, and the evolution of theories in chemistry	CHEM302/304, CHEM313/314, CHEM407-409, CHEM530/531
How to design, conduct and report research in chemistry	CHEM551/552
Applications of chemistry and chemical technology in society, business, industry and health fields	CHEM302/304, CHEM313/314, CHEM407-409, CHEM523/525, CHEM530/531

Supporting Competencies		Course number
Biology	Molecular Biology	CHEM523/525, BIOL 203/204
	Bioenergetics	CHEM523/525, BIOL 203/204
	Ecology	BIOL 203/204
Earth Science	Geochemistry	GEOL110/113/210
	Cycles of matter	GEOL110/113/210
	Energetics of Earth Systems	PHYS211/212
Physics	Energy	PHYS 211/212
	Stellar evolution	
	Properties and functions of waves	PHYS 211/212
	Properties and functions of motions	PHYS 211/212
	Properties and functions of forces	PHYS 211/212
	Electricity	PHYS 211/212
	Magnetism	PHYS 211/212
Mathematics and Statistical Concepts	Statistics	CHEM312/313/314
	Use of differential equations	CHEM407-409
	Calculus	MATH201/202

Course Descriptions

Note equivalent course experiences will be used for students completing undergraduate work at another institution.

Chemistry 105: General Chemistry I: An introductory chemistry course for those who intend to major in the sciences. Four lecture hours and one recitation per week. 4.00 Credit Hours

Chemistry 106: General Chemistry II: An introductory chemistry course for those who intend to major in the sciences. 3.00 Credit Hours

Chemistry 108: General Chemistry Laboratory: A cooperative approach to General Chemistry experimentation involving investigations of acid-base reactions, solubility, thermodynamics, enzyme kinetics, and organic sample analyses with modern NMR and IR instrumentation. 1.00 Credit Hours

Chemistry 301: Organic Chemistry I: Study of the structure, preparation and chemical and physical properties of organic compounds. 4.00 Credit Hours

Chemistry 302: Organic Chemistry II: Study of the structure, preparation and chemical and physical properties of organic compounds. 3.00 Credit Hours

Chemistry 305: Chemical Hygiene and Safety: A course in chemical hygiene and safety. Topics covered include chemical storage, chemical hygiene plans, labeling, response procedures, MSDSs, clean-up techniques, right-to-know requirements, TLV's, chemical hazards, and lab safety procedures. 1.00 Credit Hours

Chemistry 313: Quantitative Analysis: A study of some of the classic and modern techniques of quantitative chemical analysis and their theoretical bases. 3.00 Credit Hours

Chemistry 314: Quantitative Analysis Lab: A laboratory course to apply modern analysis technology. 1.00 Credit Hours

Chemistry 407: Physical Chemistry I: A calculus-based study of the theoretical foundations of chemistry. 3.00 Credit Hours

Chemistry 408: Physical Chemistry II: A calculus-based study of the theoretical foundations of chemistry. 3.00 Credit Hours

Chemistry 409: Physical Chemistry Laboratory 1.00 Credit Hours

Chemistry 523: Biochemistry I: A study of the structure, chemistry and macromolecular interactions of biochemical systems; enzyme mechanisms and kinetics, bioenergetics, intermediary metabolism, principles of biochemical techniques and molecular genetics. 3.00 Credit Hours

Chemistry 525: Biochemistry Laboratory Techniques: Laboratory emphasizes modern biochemical techniques of protein purification, assaying enzyme activity, and enzyme kinetics. 1.00 Credit Hours

Chemistry 530: Inorganic Chemistry: An intermediate level study of atomic and molecular structure, bonding, crystals, coordination compounds and selected topics. 3.00 Credit Hours

Chemistry 531: Inorganic Chemistry Laboratory: Synthesis and characterization of inorganic compounds including main group, transition metal, and organometallic species. 1.00 Credit Hours

Chemistry 551: Research 3.00 Credit Hours

Chemistry 552: Research 3.00 Credit Hours

Biology 203: Principles of Biology Laboratory: Laboratory for Biology 204. 1.00 Credit Hours

Biology 204: Principles of Biology: An overview of biology, focused on the cell, genetics, evolution, ecology, and animal behavior. 3.00 Credit Hours

Geology 110: Physical Geology: An introduction to the major geologic processes which shape the earth. 3.00 Credit Hours

Geology 113: Physical Geology Laboratory: Laboratory studies of minerals, rocks, age dating, topographic and geologic maps, groundwater, streams, mass wasting, volcanism, earthquakes, and Plate Tectonics. 1.00 Credit Hours

Geology 210: Historical Geology: A study of the origin and evolution of the earth's crust, its major features and its occupants. 3.00 Credit Hours

Mathematics 201: Calculus I: Limits, continuity, and the definition of the derivatives; techniques of differentiation, graphing, maximum/minimum and related rate problems; definite integrals and the fundamental theorem of calculus. 4.00 Credit Hours

Mathematics 202: Calculus II: A continuation of the calculus in one variable. Methods from calculus I, in addition to new techniques, will be applied to the study of integration, differential equations, sequences and series. Applications will be given in a variety of disciplines. The course will provide prerequisite material for a continued study in both mathematical topics and related scientific disciplines. Specific topics include: applications of integration, techniques of integration, improper integrals, sequences, series, power series, elementary differential equations, conic sections, and polar coordinates. 4.00 Credit Hours

Physics 211: Physics with Calculus I: A calculus-based introductory physics course primarily intended for students in the physical and mathematical sciences. The course covers mechanics, wave motion, thermodynamics, electromagnetism, optics and some modern physics. 4.00 Credit Hours

Physics 212: Physics with Calculus II: A calculus-based introductory physics course primarily intended for students in the physical and mathematical sciences. The course covers mechanics, wave motion, thermodynamics, electromagnetism, optics and some modern physics. 4.00 Credit Hours

State PK-12 Content Standards

The chemistry content requirements for MAT candidates (both options) have been mapped to the NSTA Chemistry Competencies in the previous section. The state chemistry standards for grades 9-12 are in line with these competencies as shown in the following table. Therefore, the content expectations outlined for MAT students more than prepares teacher candidates for the 9-12 standards to be taught. Finally, the key assessments for the science programs discussed earlier in this document provide further opportunities for the MAT candidates to use the 9-12 chemistry standards before program completion.

NSTA Competencies	9-12 Standard
Fundamental structures of atoms and molecules	C-2
Basic principles of ionic, covalent and metallic bonding	C-3
Physical and chemical properties and classification of elements including periodicity	C-3
Chemical kinetics and thermodynamics	C-4, C-5, C-6
Principles of electrochemistry	C-4
Mole concept, stoichiometry, and laws of composition	C-4
Transition elements and coordination compounds	C-3
Acids and bases, oxidation-reduction chemistry, and solutions	C-4
Fundamental biochemistry	C-3, C-4, C-5, C-6
Functional and polyfunctional group chemistry	C-3, C-4, C-5, C-6
Environmental and atmospheric chemistry	C-3, C-4, C-5, C-6
Fundamental processes of investigating in chemistry	C-1
Applications of chemistry in personal and community health	C-4
Molecular orbital theory, aromaticity, metallic and ionic structures, and correlation to properties of matter	C-2, C-3
Superconductors and principles of metallurgy	C-2, C-3
Advanced concepts of chemical kinetics, and thermodynamics	C-3, C-4, C-5, C-6
Lewis adducts and coordination compounds	C-2, C-3
Solutions, colloids, and colligative properties	C-3, C-4, C-5, C-6
Major biological compounds and natural products	C-3, C-4, C-5, C-6
Solvent system concepts including non-aqueous solvents	C-3, C-4, C-5, C-6
Chemical reactivity and molecular structure including electronic and steric effects	C-3, C-4, C-5, C-6
Organic synthesis and organic reaction mechanisms	C-3, C-4, C-5, C-6
Energy flow through chemical systems	C-3, C-4, C-5, C-6
Issues related to chemistry including ground water pollution, disposal of plastics, and development of alternative fuels.	C-3, C-4, C-5, C-6
Historical developments and perspectives in chemistry, including contributions of significant figures and underrepresented groups, and the evolution of theories in chemistry	C-1
How to design, conduct and report research in chemistry	C-1
Applications of chemistry and chemical technology in society, business, industry and health fields	C-1

C-1: The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.
C-2: Students will demonstrate an understanding of atomic structure and nuclear processes.
C-3: The student will demonstrate an understanding of the structures and classifications of chemical compounds.
C-4: The student will demonstrate an understanding of the types, the causes, and the effects of chemical reactions.
C-5: The student will demonstrate an understanding of the structure and behavior of the different phases of matter.
C-6: The student will demonstrate an understanding of the nature and properties of various types of chemical solutions.

Core Propositions of the NBPTS

The NSTA Teacher Preparation Standards have been linked to key program assessments and experiences in previous sections of this document. These same standards can also be linked to the NBPTS Propositions as seen in the following table, thus demonstrating links to the NBPTS Propositions.

NBPTS Propositions	NSTA Teacher Preparation Standards
Proposition 1: Teachers are Committed to Students and Their Learning	• Teachers of science recognize that informed citizens must be prepared to make decisions and take action on contemporary science- and technology-related issues of interest to the general society. They require students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values (NSTA, Standard 4). • Teachers of science create a community of diverse learners who construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies (NSTA, Standard 5). • Teachers of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field (NSTA, Standard 9).
Proposition 2: Teachers Know the Subjects They Teach and How to Teach Those Subjects to Students	• Teachers of science understand and can articulate the knowledge and practices of contemporary science. They can interrelate and interpret important concepts, ideas, and applications in their fields of licensure; and can conduct scientific investigations (NSTA, Standard 1). • Teachers of science engage students effectively in studies of the history, philosophy, and practice of science. They enable students to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science (NSTA, Standard 2). • Teachers of science engage students both in studies of various methods of scientific inquiry and in active learning through scientific inquiry. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to develop concepts and relationships from empirical experiences (NSTA, Standard 3).
Proposition 3: Teachers are Responsible for Managing and Monitoring Student Learning	• Teachers of science construct and use effective assessment strategies to determine the backgrounds and achievements of learners and facilitate their intellectual, social, and personal development. They assess students fairly and equitably, and require that students engage in ongoing self-assessment (NSTA, Standard 8). • Teachers of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field (NSTA, Standard 9).
Proposition 4: Teachers Think Systematically About Their Practice and Learn from Experience	• Teachers of science plan and implement an active, coherent, and effective curriculum that is consistent with the goals and recommendations of the National Science Education Standards. They begin with the end in mind and effectively incorporate contemporary practices and resources into their planning and teaching (NSTA, Standard 6). • Teachers of science strive continuously to grow and change, personally and professionally, to meet the diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment (NSTA, Standard 10).
Proposition 5: Teachers are Members of Learning Communities	• Teachers of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage students in science-related studies or activities related to locally important issues (NSTA, Standard 7). • Teachers of science strive continuously to grow and change, personally and professionally, to meet the diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment (NSTA, Standard 10).

Articulation

The proposed MAT chemistry options will allow students from a variety of backgrounds an opportunity for teacher certification. The MAT1 program specifically is viewed as a positive option for individuals transferring to Winthrop from a two-year institution and undergraduate chemistry majors at Winthrop who decide they would like certification. Since certification will be part of a graduate program, transfer paths from other institutions are not a major issue. However, it will be important to link the courses candidates take at other institutions in an undergraduate program to the competencies NSTA sets forth. To do this, course equivalencies to the Winthrop coursework will be used.

Estimated Costs

New Costs

Because the program will utilize existing coursework and faculty, no new costs are expected for this program in the first five years. The additional students introduced into course work for MAT and MAT1 students by the chemistry option would be absorbed within existing courses or courses being added with the new MAT1 program reviewed in Fall 2010. The only possible new costs would be associated with an increased need over time for science educators to supervise students in field placements. The current science education faculty member in the College of Arts and Sciences would be able to accommodate small increases (2-3 students) in supervision duty within her current assignment. If the number of science field experiences exceeded the capacity of the current assignment, the supervision assignment of this faculty member would increase from the equivalent of three semester hours of teaching to six semester hours of teaching per year. This minimal change will result in the need to assign one introductory level three-credit hour biology course to another faculty member. Such a change is within the current college and department capacities.

State Appropriations Request

No requests for special state appropriations are planned in association with the proposed program.

Institutional Approvals

MAT in Chemistry (traditional and one-year options)

College Curriculum.....01/26/2011
College Assembly 01/28/2011
College Dean 01/31/2011
Teacher Education Committee 02/09/2011
Graduate Council 02/23/2011
Graduate Faculty Assembly 03/12/2011
Vice President for Academic Affairs 04/15/2011
President.....05/13/2011

South Carolina Department of Education Requirements

ADEPT

ADEPT Dimensions	Course Where Addressed	Assignment/Task that addresses the APS
Introduction to ADEPT Evaluation	SPED 610 Teaching Exceptional Learners in Inclusive Settings	Overview provided
APS 1: Long-Range Planning	EDUC 690 School Internship EDUC 690 School Internship	Introduction to APS 1 Internship Evaluation Internship Long-Range Plan
APS 2: Short-Range Planning of Instruction	EDUC 690 School Internship EDUC 695 Capstone	Introduction to APS 2 Internship Evaluation Internship Work Sample
APS 3: Planning Assessments and Using Data	EDUC 690 School Internship EDUC 695 Capstone	Introduction to APS 3 Internship Evaluation Internship Work Sample
APS 4: Establishing and Maintaining High Expectations for Learners	EDUC 660 Effective Teaching Strategies EDUC 690 School Internship	Introduction to APS 4 Internship Evaluation
APS 5: Using Instructional Strategies to Facilitate Learning	EDUC 690 School Internship EDUC 695 Capstone	Introduction to APS 5 Internship Evaluation Internship Work Sample
APS 6: Providing Content for Learners	EDUC 690 School Internship SPA Content Methods Courses EDUC 695 Capstone	Introduction to APS 6 Internship Evaluation Internship Work Sample
APS 7: Monitoring, Assessing, and Enhancing Learning	EDUC 690 School Internship EDUC 695 Capstone	Introduction to APS 7 Internship Evaluation Internship Work Sample
APS 8: Maintaining an Environment that Promotes Learning	EDUC 690 School Internship EDUC 695 Capstone	Introduction to APS 8 Internship Evaluation Internship Work Sample
APS 9: Managing the Classroom	EDUC 690 School Internship EDUC 695 Capstone	Introduction to APS 9 Internship Evaluation Internship work Sample

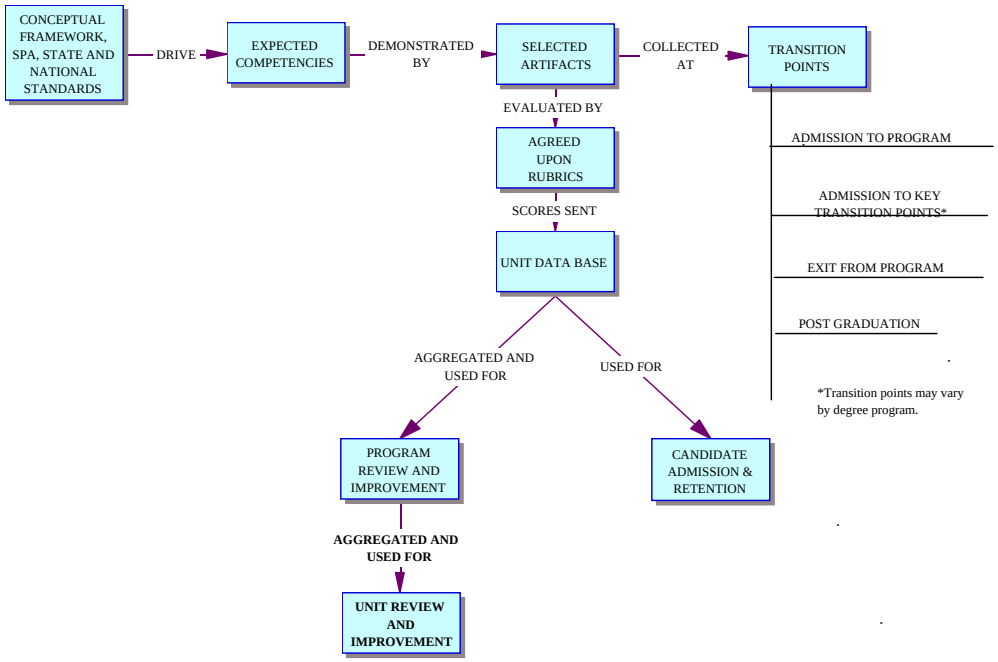
ADEPT Dimensions	Course Where Addressed	Assignment/Task that addresses the APS
APS 10: Fulfilling Professional Responsibilities	EDUC 690 School Internship EDUC 690 School Internship	Internship Evaluation Professional Resume

Assessment Plan

The RWR College of Education has an Assessment Plan on file with the Educator Preparation Unit of the South Carolina Department of Education (filed 2003). This section will provide a brief overview of the major features of that plan with an emphasis on the MAT program and candidate data.

*The Assessment System***.** The assessment system was developed in collaboration with PK-12 faculty and received full approval from NCATE in 2003. A review of the Unit by NCATE is in the initial stages, with a visit planned for the 2011-2012 academic year. The figure below provides an overview of the design of the system.

Unit Assessment Plan



The MAT Conceptual Framework, Specialized Professional Association (e.g., NSTA) standards, and state standards are the drivers for the expected competencies for candidates at Winthrop University. These competencies were determined in collaboration with the professional community. Candidate competence on each outcome is assessed at multiple points across the program by key assessments. Candidate data on each assessment is stored in the LiveText database. The scores are collected at the end of each semester from the instructors of the appropriate courses. These data are aggregated to produce a candidate profile. This profile is

reviewed by faculty in the program annually. In addition, the data have been aggregated across candidates and program for examination over time. These aggregated scores are used for program and unit improvement.

Decisions about candidate performance are based on multiple assessments at four points: admission to the MAT program; two transition points -- admission to teacher education and admission to the internship; and a final review to determine program completion at the end of all coursework. At each decision point, a committee examines multiple assessments of candidate performance and dispositions. The table that follows contains a description of assessments used to determine admission, continuation in, and completion of the MAT program.

MAT Key Transition Points and Performance Measures

Admission to Program	Admission to Teacher Education	Admission to Internship	Exit from Program
Admission index score (GRE & GPA) ≥ 8 as defined by current graduate catalog	GPA ≥ 3.0 on graduate course work since admission to the program	GPA ≥ 3.0 on all graduate course work since admission	GPA ≥ 3.0 on graduate course work since admission
GRE score of ≥ 400 on both verbal & quantitative	Verification of satisfactory completion of 25 hours of youth experience	Achievement of SC passing score on Praxis II Specialty Area Examination	Satisfactory completion of the IWS.
Satisfactory completion of parts 1 & 2 of writing sample	Satisfactory review of any Professional Dispositions & Skills forms in the candidate's file	Satisfactory review of any Professional Dispositions & Skills forms in the candidate's file	Satisfactory review of any Professional Dispositions & Skills forms in the candidate's file
Score ≥ 4 on Admission to Program Rubric	Satisfactory completion of an admission interview Score > 6 on Admission Interview Rubric	Completion of all pedagogical courses, all required prerequisites & at least nine hours of content. Satisfactory performance on the Field Experience Final Evaluation.	Satisfactory completion on the Internship Final Evaluation.

Data Collection, Analysis, and Evaluation. Data are collected on applicant qualifications at admission and on candidate proficiencies during matriculation through the program. Candidate proficiency data sources include both internal and external measures. Internal measures include rubric scores on key assignments, observation rating scales administered in field settings, and course grades. External measures include scores on standardized assessments such as Praxis II and alumni and employer surveys. Since fall 2007, all candidate proficiency data has been collected through the commercial software program LiveText. This program provides a data warehouse and is capable of producing some reports. Data such as candidate demographic information and course grades are also collected and available for analysis. A Unit Assessment Coordinator is responsible for the collection and dissemination of the college data. A Unit Assessment Committee provides guidance for these processes.

Use of Data for Program Improvement. Since the inception of the Unit Assessment System in 2001, the COE has established a data-driven culture. Faculty regularly share data on candidate proficiencies and unit operations and are increasingly basing decisions at all levels on data,

rather than perceptions. Programs receive candidate proficiency data at least yearly and are required to review and comment on their program data. SPA Program Coordinators are required to submit an annual report to the Unit Assessment Committee. This report contains a data summary and describes actions taken during the year. The Unit Assessment Committee reviews the reports and provides feedback to the program on their progress in the area of assessment and use of data for program improvement.

The Diversity Plan

The College of Education has provided *NCATE Standard 4: Diversity* updates to the Educator Preparation Unit of the South Carolina Department of Education yearly since first requested in 2005. Goals in each of the four elements of diversity are established annually. A Diversity Committee, which includes representation from all departments as well as the Colleges of Arts & Sciences and Visual & Performing Arts, oversees and provides guidance for work in this area. The following paragraphs provide an overview of the work in each of the four elements of diversity.

Design and Implementation of Curriculum and Experiences. Core courses provide a sequence of assignments and experiences which prepare candidates working with diverse students, families, and communities. This course work is reviewed periodically and efforts are made to insure program currency. For example, in 2007, the COE received a Federal Grant from the US Department of Education, *Teaching Teachers to Work with English Language Learners (Teaching* Teachers W.E. L. L.). This grant provides support for infusing ELL competencies across the curriculum for teacher preparation. In addition, curriculum is currently under review as part of the *NetSCOPE* grant (Network of Sustained, Collaborative, Ongoing Preparation for Educators, a Teacher Quality Partnership Grant from the US Department of Education) to infuse the teacher preparation program with even more experiences in working with diverse learners.

Faculty development is important for design and delivery of contemporary curriculum and experiences. To assist with this, the COE provides support yearly for outside speakers on topics related to diversity issues.

Experiences Working with Diverse Faculty. The COE has had a long-term commitment to increasing the diversity of the faculty. Approaches include targeted advertizing and recruitment, as well as the establishment of a faculty support group on campus.

Experiences Working with Diverse Candidates. The University and the COE have made significant gains in recruiting and retaining diverse students. In fall 2009, the percentage of non-white students in graduate population was 23.3% and the undergraduate population was 33.5%. Recent efforts in the COE have focused in retention of minority students. Special programs have been implemented at the college and university levels. Further the College of Arts and Sciences and College of Education were awarded a Robert Noyce Scholarship Program grant through the National Science Foundation in Fall 2010. The *Winthrop Initiative for STEM*

Educators include funds and support directed at diversifying the STEM teacher population in high needs schools.

Experiences Working with Diverse Students in PK-12 Schools. The COE makes every attempt to ensure that teacher candidates have experiences working with diverse student populations. Since fall 2002, the COE has implemented a diversity placement plan. Each teacher candidate in the initial licensure programs (including MAT/MAT5) are required to have a diverse placement in their field experience or internship experience. A placement is considered diverse if 40% or more of the students in the school are non-white and/or are on free/reduced lunch. Progress is reviewed annually. For the last three years, over 95% of our students have had at least one diverse placement.

Education Economic Development Act (EEDA)

The EEDA is addressed throughout the teacher education program. The chart that follows highlights the EEDA emphasis for Winthrop University in the MAT/MAT5 programs.

EEDA Performance Standard	EDUC Courses	Activity	Assessment
1. Career Guidance Process	EDUC 600	Overview of the law in a political context	Web Quest
2. Career Clusters (IGP)	EDUC 600	Overview of the law in a political context	Web Quest
3. Career Guidance Model	EDUC 690	Internship Institute	TBA
4. Character Education	EDUC 610	Teaching fairness and equity	LEARNS worksheet
5. Real World Applications	EDUC 610	Technology applications; teaching strategies	Barriers & accommodations assignment
6. Cooperative Learning	EDUC 610	Models for co-teaching and collaboration	Exam
7. Teaching Diverse Learners	EDUC 610	Teaching of concepts: cognitive strategies, UDL, technology, and accommodations	LEARNS worksheet

Field and clinical experiences

MAT and MAT1 students will participate in the following field experiences in addition to the 25-hour youth experience.

> SCIE 592, Field Experience in Biology, Teacher candidates work in a classroom setting in their discipline for a minimum of 116 hours. In this experience, candidates plan, teach, and reflect on lessons and complete assignments associated with the discipline area methods course (SCIE 591).

EDUC 690, Internship in Reflective Practice: Teacher Candidates are placed in grade 9-12 chemistry classrooms 5 days a week for 15 weeks for a minimum of 600 hours. In this experience, candidates have experience in the full range of responsibilities of the classroom teacher and assume full-time planning and teaching for a minimum of eight weeks.

PK-12 Academic Standards

The chemistry content requirements for MAT and MAT1 candidates have been mapped to the NSTA Chemistry Competencies in the previous section. The state chemistry standards for grades 9-12 are in line with these competencies as shown in the following table. Therefore, the content expectations outlined for MAT and MAT1 students more than prepare teacher candidates for the 9-12 standards to be taught. Finally, the key assessments for the science programs discussed earlier in this document provide further opportunities for the MAT and MAT1 candidates to use the 9-12 chemistry standards before program completion.

NSTA Competencies	9-12 Standard
Fundamental structures of atoms and molecules	C-2
Basic principles of ionic, covalent and metallic bonding	C-3
Physical and chemical properties and classification of elements including periodicity	C-3
Chemical kinetics and thermodynamics	C-4, C-5, C-6
Principles of electrochemistry	C-4
Mole concept, stoichiometry, and laws of composition	C-4
Transition elements and coordination compounds	C-3
Acids and bases, oxidation-reduction chemistry, and solutions	C-4
Fundamental biochemistry	C-3, C-4, C-5, C-6
Functional and polyfunctional group chemistry	C-3, C-4, C-5, C-6
Environmental and atmospheric chemistry	C-3, C-4, C-5, C-6
Fundamental processes of investigating in chemistry	C-1
Applications of chemistry in personal and community health	C-4
Molecular orbital theory, aromaticity, metallic and ionic structures, and correlation to properties of matter	C-2, C-3
Superconductors and principles of metallurgy	C-2, C-3
Advanced concepts of chemical kinetics, and thermodynamics	C-3, C-4, C-5, C-6
Lewis adducts and coordination compounds	C-2, C-3
Solutions, colloids, and colligative properties	C-3, C-4, C-5, C-6
Major biological compounds and natural products	C-3, C-4, C-5, C-6
Solvent system concepts including non-aqueous solvents	C-3, C-4, C-5, C-6
Chemical reactivity and molecular structure including electronic and steric effects	C-3, C-4, C-5, C-6
Organic synthesis and organic reaction mechanisms	C-3, C-4, C-5, C-6
Energy flow through chemical systems	C-3, C-4, C-5, C-6
Issues related to chemistry including ground water pollution, disposal of plastics, and development of alternative fuels	C-3, C-4, C-5, C-6
Historical developments and perspectives in chemistry, including contributions of significant figures and underrepresented groups, and the evolution of theories in chemistry	C-1
How to design, conduct and report research in chemistry	C-1
Applications of chemistry and chemical technology in society, business, industry and health fields	C-1

C-1: The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.
C-2: Students will demonstrate an understanding of atomic structure and nuclear processes.
C-3: The student will demonstrate an understanding of the structures and classifications of chemical compounds.
C-4: The student will demonstrate an understanding of the types, the causes, and the effects of chemical reactions.
C-5: The student will demonstrate an understanding of the structure and behavior of the different phases of matter.
C-6: The student will demonstrate an understanding of the nature and properties of various types of chemical solutions.

Admission Requirements

MAT. Graduate candidates who hold a baccalaureate degree from an accredited college or university in a related field may enroll in the MAT degree program. Content preparation is evaluated against the expectations for the program and applicants are directed to prerequisite needs and courses to complete as part of the program (content requirements are provided on page 7). Admission requirements include:

1. An Admission Index Score of eight. (The Admission Index Score is derived by a formula-based computation of the graduate candidate's undergraduate grade-point average (GPA) and a score on the General Test of the Graduate Record Examination (verbal and quantitative sections);
2. An official GRE score of at least 400 on both the verbal and quantitative sections of the exam; and
3. Satisfactory completion of a writing sample as prescribed by the MAT program director.

MAT1. Graduate candidates who hold a baccalaureate degree from an accredited college or university in chemistry, biochemistry, or equivalent program (awarded within two years of the application) may enroll in the MAT5 degree program. Content preparation is evaluated against the expectations for the program and applicants must meet all content expectations for admission (content requirements are provided on page 7). Admission requirements include:

1. Undergraduate GPA of 2.75 and
2. Passing score on the required PRAXIS II Content examination: Chemistry, Physics and General Science (Test 0070).

Admission to Teacher Education. During the semester, the graduate candidate will complete a total of 12 hours of graduate coursework; graduate candidates must be formally admitted to the Teacher Education Program. For admission, candidates are required to have completed no fewer than six hours of required education courses and at least three hours of content coursework (MAT only). Requirements include:

1. 3.0 grade-point average in graduate course work;
2. A complete application requesting formal admission to teacher education that includes an analysis of learning thus far in the MAT Program;

3. A minimum of 25 hours of supervised Youth Experience with students within the age range of the certification level sought; and
4. An interview with two professors (one from Education and one from the sciences) resulting in a favorable admission recommendation to the Dean of Education.

Admission to the Internship. Graduate candidates must be formally admitted no later than one full semester prior to student teaching. A disclosure form regarding criminal activity or campus misconduct must be submitted with the application. Furthermore, students must have a full background check through the SC Law Enforcement Agency. Any submitted Teacher Education Professional Dispositions and Skills Forms will be reviewed prior to admission. Finally, candidates must achieve a passing score on the PRAXIS II Specialty Area Examination (MAT1 candidates are required to have passing score at admission).

Program Completion. To complete the program, candidates must meet the following criteria:
1. successful completion of all required coursework;
2. maintenance of a minimum grade point average of 3.00;
3. successful completion of all field experiences and internships; and
4. passing score on the required Praxis II examination in chemistry.

At the end of the internship semester, a program area committee completes a competency review of each intern's performance and recommends exit from the program. Exit criteria include the following: (a) passing scores on rubrics for final portfolio documents, midterm and final internship evaluations, and rubrics for unit work samples; (b) satisfactory review of any Professional Dispositions and Skills Forms; and (c) a minimum grade point average of 3.0.

South Carolina Safe School Climate Act

As part of EDUC660, Effective Teaching and Management Strategies, students explore the concept of bullying and strategies for addressing this issue with students of multiple age groups. Candidate ability to apply this information is assessed through the management plans designed within the course.

Standards of Conduct

The College of Education has established a set of dispositions that act as a standard for appropriate conduct within the teaching profession and preparation program. When candidates deviate from the expectations, these are noted in the candidate's file and reviewed at the time of admission to the program, admission to internship, and exit from the program. In addition, disposition data is available through targeted questions on the field placement evaluation forms. Further, the college is in the pilot stages of additional information collection. In the pilot, all candidates enrolled in particular courses (for example the science methods course), will self-evaluate dispositions. The instructor will also evaluate dispositions associated with course work, allowing for the tracking of dispositions that are demonstrated regularly as

well as those that need additional attention or may be of concern for field placements or program completion.

NSTA Standards and Report

Context Section from NSTA Report

State or institutional policies that may influence the application of NSTA standards. The South Carolina Department of Education Policy Guidelines for Educator Preparation are closely aligned with NCATE standards. However, the state does impose additional requirements for educator preparation units at the initial preparation level. All candidates must: (a) know, understand, and apply the appropriate South Carolina PK-12 academic standards, (b) possess the knowledge, skills, and dispositions to integrate the EEDA (Education and Economic Development Act) standards, and (c) possess the knowledge, skills, and dispositions to identify and prevent bullying, harassment, and intimidation in the schools. All preparation units must integrate the South Carolina ADEPT (Assisting, Developing, and Evaluating the Performance of Teachers) standards throughout candidate course work and field/clinical experiences and provide evidence that all candidates meet the ADEPT competencies.

In regards to clinical practice, the state requires a minimum of 100 hours of field experience prior to clinical practice. Clinical practice must take place in a public school setting and be equivalent to a minimum of 60 full days or 12 weeks. Before admission to the MAT program, past science and mathematics coursework is evaluated in light of the content requirements for certification in the state. Candidates receive information on courses they must complete before beginning the MAT program and courses they should take while enrolled in the MAT program. MAT candidates are required to complete 12 hours of graduate level science courses and three hours of science education specific coursework as part of their graduate degree. MAT1 candidates must have all expectations for content complete before admission to the program.

Field and Clinical Experiences. The Winthrop secondary chemistry initial teacher preparation program provides a well-integrated set of field experiences. For MAT students, the following field experiences are included:

- SCIE 592, Field Experience, Teacher candidates work in a classroom setting in the discipline for a minimum of 116 hours. In this experience, candidates plan, teach, and reflect on lessons and complete assignments associated with the discipline area methods course (SCIE 591).
- EDUC 690, Internship in Reflective Practice: Teacher candidates are placed in grade 9-12 chemistry classrooms five days a week for 15 weeks for a minimum of 600 hours. In this experience, candidates have experience in the full range of responsibilities of the classroom teacher and assume full-time planning and teaching for a minimum of eight weeks.

Criteria used for selecting sites. The Office of Student Academic Services (SAS) at Winthrop University works collaboratively with the science teacher education faculty to select the most appropriate sites and mentor teachers. Sites are negotiated at the district level and individual placements typically at the building level. SAS maintains contractual agreements based on multiple criteria. The school district/school must possess (a) a sound and innovative curriculum in secondary chemistry which will offer teacher candidates opportunities to develop and demonstrate initiative and resourcefulness as teachers, and (b) an administrative and teaching staff genuinely interested in teacher education at the pre-service level. This includes, but is not limited to:

1) a willingness to attend training programs necessary to prepare for serving as a cooperating school;
2) a willingness to provide appropriate learning experiences for teaching interns;
3) a willingness to provide continuous supervision and daily/weekly conferences to assist the intern in professional development;
4) a willingness to work cooperatively with Winthrop University staff members in all aspects of the internship/field experience; and
5) a willingness to select mentor teachers who meet Winthrop University's criteria for selecting mentor teachers.

Diversity of PK-12 students is an additional factor in site selection. Current PK-12 student demographic information at the building level is used to categorize schools as diverse or non-diverse. The definition of a diverse school is a poverty index above 40% and/or non-white student enrollment greater than 40%. All MAT and MAT1 candidates have a placement in a diverse setting for either their field experience or internship.

The secondary science teacher education faculty meets with the SAS field placement coordinator to determine individual placements for secondary science teacher candidates. Multiple variables are considered: candidate strengths and needs, mentor and classroom characteristics, and site diversity.

Criteria for selecting and training cooperating teachers and faculty supervisors. ADEPT legislation, passed by the South Carolina Legislature, requires that certain guidelines are followed in working with teacher candidates in field settings. The ADEPT system is designed to measure teacher performance on the 10 ADEPT Performance Standards which pertain to planning, instruction, assessment and professionalism. ADEPT evaluators are trained to evaluate candidates' performance during informal and formal observations. University supervisors and mentor teachers must attend a one-day ADEPT training session (if not already trained by their school districts), and must participate each semester in a workshop addressing Winthrop University evaluation instruments and guidelines for intern/field experience candidate supervision.

University supervisors are master teachers in the secondary science education field and demonstrate the professional dispositions required by Winthrop University. Whenever possible, teacher candidates are placed under the supervision of a full-time Winthrop University

science teacher education faculty member. Part-time supervisors must have been a former chemistry teacher and/or an administrator in a science program and must possess the following: a) at least five years of successful teaching, b) written or verbal recommendations of former supervisors or administrative colleagues, c) current or former state teacher's license in Chemistry or Broad Field Science, and d) a Master's degree.

All mentor teachers who supervise chemistry teacher education candidates are certified in chemistry or broad-field science and must meet multiple criteria for selection. Mentors must have: a) approval by principal and district office, b) an outstanding performance evaluation for the last two years of teaching, and c) attained continued contract status and had a minimum of three years of teaching experience. In addition, mentors must exhibit the following characteristics: a) model excellence in teaching; b) exhibit high expectations for students; c) demonstrate strong skills in planning, oral/written communications, collaborative decision making, judgment, and human relations; d) possess strong instructional skills and current content knowledge in the field of science education; e) display strong skills in collaborating with other teachers and parents; and f) commit to the time and effort needed to serve as a mentor.

NSTA assessments

Type Assessment	Name of Assessment	Type	When the Assessment Is Administered
Licensure Tests	Praxis II: Chemistry, Physics and General Science (0070)	South Carolina licensure test	Must pass before student starts internship for MAT and before admission for MAT1
Assessment of general content knowledge in discipline to be taught	Required science and math courses	GPA	courses are taken throughout program or before admission; GPA compiled at completion of program
Planning instruction and assessment	Unit Work Sample	project	SCIE591- Principles of Teaching Science
Student Teaching Assessment	Field Experience/ Internship Mid-term and Final Evaluations	clinical evaluation forms	Field Experience and Internship (SCIE592 and EDUC690)
Effects on Student Learning	a) Assessment of Student Learning b) NSTA 5b- Addendum to Internship Work Sample	projects	a) completed as a project in SCIE591-Principles of Teaching Science b) completed as an addendum to the Internship Work Sample required for EDUC690
Legal/Safety/ Ethical Issues	Safety Module	exam and safety plan	SCIE591-Principles of Teaching Science
Research & Investigation	Independent Research Project	project	CHEM551/552
Contextual Content	1) Nature of Science; 2) Inquiry; 3) Unifying Concepts; 4) Personal and Technical Applications; 5) Issues; 6) Science in the Community	six projects with varying essays and lesson plans completed as a project	Science 391/591-Principles of Teaching Science

Relationship of Assessments to Standards

1. Content. Teachers of science understand and can articulate the knowledge and practices of contemporary science. They can interrelate and interpret important concepts, ideas, and applications in their fields of licensure; and can conduct scientific investigations. To show that they are prepared in content, teachers of science must demonstrate that they								
	1	2	3	4	5	6	7	8
(a) understand and can successfully convey to students the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields as recommended by the NSTA	✓	✓	✓	✓	✓			
(b) understand and can successfully convey to students the unifying concepts of science delineated by the National Science Education Standards			✓					✓
(c) understand and can successfully convey to students important personal and technological applications of science in their fields of licensure			✓					✓
(d) understand research and can successfully design, conduct, report and evaluate investigations in science							✓	
(e) understand and can successfully use mathematics to process and report data, and solve problems, in their field(s) of licensure.							✓	
2. Nature of Science. Teachers of science engage students effectively in studies of the history, philosophy, and practice of science. They enable students to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science. To show they are prepared to teach the nature of science, teachers of science must demonstrate that they:								
	1	2	3	4	5	6	7	8
(a) understand the historical and cultural development of science and the evolution of knowledge in their discipline				✓				✓
(b) understand the philosophical tenets, assumptions, goals, and values that distinguish science from technology and from other ways of knowing the world				✓				✓
(c) engage students successfully in studies of the nature of science including, when possible, the critical analysis of false or doubtful assertions made in the name of science			✓	✓	✓			
3. Inquiry. Teachers of science engage students both in studies of various methods of scientific inquiry and in active learning through scientific inquiry. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to develop concepts and relationships from empirical experiences. To show that they are prepared to teach through inquiry, teachers of science must demonstrate that they:								
	1	2	3	4	5	6	7	8
(a) understand the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge				✓				✓
(b) engage students successfully in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner			✓	✓	✓			
4. Issues. Teachers of science recognize that informed citizens must be prepared to make decisions and take action on contemporary science- and technology-related issues of interest to the general society. They require students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values. To show that they are prepared to engage students in studies of issues related to science, teachers of science must demonstrate that they:								
	1	2	3	4	5	6	7	8
(a) understand socially important issues related to science and technology in their field of licensure, as well as processes used to analyze and make decisions on such issues				✓				✓
(b) engage students successfully in the analysis of problems, including			✓	✓	✓			

considerations of risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals and values of the students								

5. General Skills of Teaching. Teachers of science create a community of diverse learners who construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies. To show that they are prepared to create a community of diverse learners, teachers of science must demonstrate that they

	1	2	3	4	5	6	7	8
(a) vary their teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding								
(b) successfully promote the learning of science by students with different abilities, needs, interests, and backgrounds				✓				
(c) successfully organize and engage students in collaborative learning using different student group learning strategies				✓				
(d) successfully use technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science				✓				
(e) understand and build effectively upon the prior beliefs, knowledge, experiences, and interests of students				✓				
(f) create and maintain a psychologically and socially safe and supportive learning environment				✓				

6. Curriculum. Teachers of science plan and implement an active, coherent, and effective curriculum that is consistent with the goals and recommendations of the National Science Education Standards. They begin with the end in mind and effectively incorporate contemporary practices and resources into their planning and teaching. To show that they are prepared to plan and implement an effective science curriculum, teachers of science must demonstrate that they:

	1	2	3	4	5	6	7	8
(a) understand the curricular recommendations of the National Science Education Standards, and can identify, access, and/or create resources and activities for science education that are consistent with the standards			✓		✓			
(b) plan and implement internally consistent units of study that address the diverse goals of the National Science Education Standards and the needs and abilities of students			✓					

7. Science in the Community. Teachers of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage students in science-related studies or activities related to locally important issues. To show that they are prepared to relate science to the community, teachers of science must demonstrate that they:

	1	2	3	4	5	6	7	8
(a) identify ways to relate science to the community, involve stakeholders, and use community resources to promote the learning of science			✓	✓				✓
(b) involve students successfully in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community			✓	✓				

8. Assessment. Teachers of science construct and use effective assessment strategies to determine the backgrounds and achievements of learners and facilitate their intellectual, social, and personal development. They assess students fairly and equitably, and require that students engage in ongoing self-assessment. To show that they are prepared to use assessment effectively, teachers of science must demonstrate that they:

	1	2	3	4	5	6	7	8
(a) use multiple assessment tools and strategies to achieve important goals for instruction that are aligned with methods of instruction and the needs of students			✓	✓	✓			
(b) use the results of multiple assessments to guide and modify instruction,			✓	✓	✓			

the classroom environment, or the assessment process								
(c) use the results of assessments as vehicles for students to analyze their own learning, engaging students in reflective self-analysis of their own work			✓	✓				
9. Safety and Welfare. Teachers of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field. To show that they are prepared, teachers of science must demonstrate that they:								
	1	2	3	4	5	6	7	8
(a) understand the legal and ethical responsibilities of science teachers for the welfare of their students, the proper treatment of animals, and the maintenance and disposal of materials			✓	✓		✓		
(b) know and practice safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction			✓	✓		✓		
(c) know and follow emergency procedures, maintain safety equipment, and ensure safety procedures appropriate for the activities and the abilities of students			✓	✓		✓		
(d) treat all living organisms used in the classroom or found in the field in a safe, humane, and ethical manner and respect legal restrictions on their collection, keeping, and use			✓	✓		✓		
10. Professional Growth. Teachers of science strive continuously to grow and change, personally and professionally, to meet the diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment. To show their disposition for growth, teachers of science must demonstrate that they:								
	1	2	3	4	5	6	7	8
(a) engage actively and continuously in opportunities for professional learning and leadership that reach beyond minimum job requirements				✓				
(b) reflect constantly upon their teaching and identify ways and means through which they may grow professionally				✓	✓			
(c) use information from students, supervisors, colleagues and others to improve their teaching and facilitate their professional growth				✓	✓			
(d) interact effectively with colleagues, parents, and students; mentor new colleagues; and foster positive relationships with the community				✓				

Planned Evidence for Meeting Standards

Assessment 1: Licensure Test. For certification as a secondary chemistry teacher, South Carolina requires teacher candidates pass the Praxis II: Chemistry, Physics and General Science (0070) with a score of 540 or higher. MAT1 candidates must pass PRAXIS II: Chemistry, Physics and General Science (0070) before formal admission into the program.

Assessment 2: Assessment of general content knowledge in the discipline to be taught. The GPA from all required science and mathematics courses or their equivalent is figured (NSTA Standard 1a). These data are used to track candidate preparation previous to and throughout the program.

Assessment 3: Planning, instruction, and assessment. The Unit Work Sample is a sequence of lesson plans and accompanying assessments completed by all teacher candidates as the culminating project for Principles of Teaching Science (SCIE 591) that is taken as a co-requisite with Field Experience in Teaching Science (SCIE 592) in which candidates are placed in a public school eight hours a week (full day or two half days). This Unit is a sequence of at least five related lessons that align with specific national and state 9-12 content standards (NSTA 6a-b). Teacher candidates develop Unit Goals and a Rationale that show understanding of the role of each of the following NSTA Teacher Education Standards in their Unit: appropriate biological concepts, principles and theories

(1a), NSES Unifying Concepts (1b), important personal and technical applications (1c), the nature of science (2a-c), inquiry methods (3a-b), socially important issues (4a-b,) and science in the community (7a-b). Aside from incorporating the above standards, lesson plans also include applicable safety precautions (9a-d) and accommodations for diverse learners. Additionally, the Unit includes an assessment plan that describes the multiple formative and summative assessments that will be utilized, ways assessment data will be used to guide and modify instruction, and plans to use assessment to engage the learners in self-reflection (8a-c).

Assessment 4: Student Teaching Assessment. The evaluations of field placements include assessment tools used during Field Experience (SCIE 592) and Internship and (EDUC 690). The Field Experience is a part-time teaching assignment where teacher candidates are assigned to a mentor teacher for eight hours a week (one full day/week or two half days/week). The Internship is a full-time teaching assignment where candidates are assigned to a mentor teacher for the entire semester. In both cases, there is a university supervisor that meets with and assists the candidate and mentor teacher as needed, conducts formal observations of the candidate performing instruction, and completes all evaluations. In addition, a school-based, ADEPT trained evaluator conducts formal observations in all placements to provide additional assessment of candidate performance. Most importantly, this assessment (both evaluation tools) aligns with NSTA Standard 9-Safety and Welfare. Teacher candidates are evaluated during both the Field Experience and the Internship on this standard and its indicators. In addition, the science program specific portion of the evaluation instruments explicitly measure teacher candidates on their performance in the areas of nature of science (NSTA Standard 2), teaching by inquiry methods (NSTA Standard 3), socially important issues (NSTA Standard 4), science in the local community (NSTA Standard 7), and professionalism (NSTA Standard 10). Finally, the portions of the instruments that are common to all programs effectively measure NSTA Standard 5-General Skills of Teaching, NSTA Standard 6-Curriculum, NSTA Standard 8-Assessment, and NSTA Standard 10-Professionalism.

Assessment 5: Effects on Student Learning. MATs will complete sub-assessment #5a during SCIE 591/592 (Principles of Teaching Science and Field Experience) and sub-assessment #5b during EDUC 690 (Internship). The main goals of this assignment are for teacher candidates to measure the student learning that occurs during a lesson they teach at their eight-hour/week Field Experiences (SCIE 592) and during a complete unit they have designed and implemented while completing the Internship (EDUC 690). Teacher candidates are asked to design objectives/goals that relate to appropriate content (NSTA Standard 1a), incorporate the nature of science (NSTA 2c), utilize inquiry methods (NSTA Standard 3b), and include relevant social issues (NSTA 4b). After the candidate has engaged students in instruction targeting the identified goals and objectives, post assessments indicate level of student growth and candidate effect on student learning.

Assessment 6: Legal/Safety/Ethical Issues. This assessment consists of a safety exam (written and practical) and a safety plan. It is designed to assess the teacher candidate's knowledge of the legal and ethical responsibilities of science teachers pertaining to laboratory safety and the proper treatment of animals (NSTA Standards #9 a,b,c,d). All candidates are required to successfully complete this assessment module. MAT and MAT1 candidates will complete this assessment during the Principles of Teaching Science course (SCIE591).

These standards will also be assessed during both the clinical experiences (Field Experience and Internship) on the Evaluation forms (assessment #4) and during lesson planning (assessment #3). Specifically, candidates will:

a. Score an 80% or better on an each section (NSTA 9a, 9b,9c and 9d) of an exam which includes traditional paper and pencil questions, but also a safety inspection; this exam will cover legal and ethical responsibilities, general principles of safety, emergencies, handling of materials, and treatment and collection of living organisms.
b. Develop a Safety Plan that demonstrates both knowledge and plans for maintaining a safe classroom, including a lesson plan to introduce Safety to students (NSTA 9a, 9b, 9c and 9d); these items must be completed at the Acceptable level or higher.

Assessment 7: Research & Investigation. Winthrop chemistry majors and MAT candidates will complete this assessment during CHEM551/552. Teacher candidates will design, implement, and mathematically analyze the results of his/her original independent research project; therefore, this assessment is specifically aligned to NSTA

standards 1d and 1e. For students from institutions other than Winthrop University, evidence of a research experience will be required or candidates will take CHEM551/552.

Assessment 8: Contextual Content. This assessment is a portfolio of six assignments that are completed throughout the semester**.** It is completed by MAT/MAT1 teacher candidates during the SCIE 591 (Principles of Teaching Science) course. In each assignment, teacher candidates are asked to show an understanding of the specific context of science in general, and then align it to content to be taught with specific examples they can utilize in the future.

a. In assignment #1, teacher candidates show understanding of the nature of science by researching two historical figures in their content area, writing about the lives and contributions of the figures, and then explaining the work of each illustrating multiple aspects of the nature of science (NSTA Standard 2a-b).
b. In assignment #2, teacher candidates exhibit understanding of inquiry by completing a resource packet which includes resources used to develop an essay about teaching science via multiple inquiry methods, an inquiry method essay, and five instructional inquiry materials aligned to the content with a summary of each material and the level of inquiry each represents(NSTA Standard 3a.)
c. In assignment #3, teacher candidates show understanding of the Unifying Concepts by summarizing each of the National Science Education Standards Unifying Concepts, aligning at least one SC Science Standard to each of the Unifying concepts, and designing one lesson plan that aligns to at least one Unifying Concept (NSTA Standard 1b).
d. In assignment #4, teacher candidates show an understanding of the practical and technical applications of their content area by choosing two applications related to the SC Science Standards, researching these applications, and then completing an essay that includes a rationale of how these align to the SC Standards, descriptions of the applications, and possible ways to incorporate these into the classroom (NSTA Standard 1c).
e. In assignment #5, teacher candidates exhibit understanding of socially important issues and processes to analyze those issues by listing five important social issues aligned to science content standards, choosing one for research into both sides of the issue, and leading the class in an analysis of this issue (NSTA 4a).
f. In assignment #6, teacher candidates show understanding of science in the community and local resources by researching background information related to at least five local resources connected to the SC Science Standards, and then creating a lesson plan that incorporates one local resource (NSTA 7a).

Use of Assessment Results

Program data are reviewed annually by program faculty to facilitate changes in the program. The science education faculty and the Unit will continue this trend with data collected from candidates in the chemistry option.

Changes that have been made in program

Curriculum action to add the MAT in chemistry with traditional and one-year options was completed at Winthrop during the 2010-2011 academic year.